Analytical chemistry questions essay sample

Science, Chemistry

A 1. 000g sample of unknown analyzed by Reaction 7-2 gave 2. 500g of bis(dimethylglyoximate) nickel(II). Find the wt% of Ni in the unknown. 7-8) The man in the vat. Once upon a time, a workman at a dye factory fell into a vat containing a hot concentrated mixture of sulfuric and nitric acids, and he dissolved! Because nobody witnessed the accident, it was necessary to prove that he fell in so that the man's wife could collect his insurance money. The man weighed 70kg, and a human body contains about 6. 3 parts per thousand phosphorus. The acid in the vat was analyzed for phosphorus to see if it contained a dissolved human. a) The vat had 8. 00 x 10 raise to 3L of liquid, and 100. 0mL were analyzed. If the man did fall into the vat, what is the expected quantity of phosphorus in 100. 0mL? b) The 100. 0mL sample was treated with a molybdate reagent that precipitates ammonium phosphomolybdate, (NH4)3 [P(Mo12O40)] x 12H2O. This substance was dried at 110 degree C to remove waters of hydration and heated to 400 degree C until it reached a constant composition corresponding to the formula P2O5 x 24MoO3, which weighed 0. 3718g. When a fresh mixture of the same acids (not from the vat) was treated in the same manner, 0. 0331g of P2O5 x 24MoO3 (FM 3596. 46) was produced.

This blank determination gives the amount of phosphorus in the starting reagents. The P2O5 x 24MoO3 that could have come from the dissolved man is therefore 0. 3718 – 0. 0331 = 0. 3387g. How much phosphorus was present in the 100. 0mL sample? Is this quantity consistent with a dissolved man? 7-10) Finely ground mineral (0. 6324g) was dissolved in 25mL of boiling 4M HCl and diluted with 175mL H2O containing two drops of methyl red indicator. The solution was heated to 100 degree C, and 50mL of warm

solution containing 2. 0g (NH4)2 C2O4 were slowly added to precipitate CaC2O4. Then 6M NH3 was added until the indicator changed from red to yellow, showing that the liquid was neutral or slightly basic. After slow cooling for 1h, the liquid was decanted and the solid transferred to a filter crucible and washed with cold 0. 1wt% (NH4)2 C2O4 solution five times until no Cl negative anion was detected in the filtrate on addition of AgNO3 solution. The crucible was dried at 105 degree C for 1h and then at 500 degree plus minus 25 degree C in a furnace for 2h.

Chemical Equation:
Ca positive 2 cation and below it there FM 40. 078, + C2O4 negative 2 anion Right Arrow and above it there 105 degree C, CaC2O4 x H2O(s) Right Arrow and above it there 500 degree C, CaCO3(s) and below it there FM 100. 087. The mass of the empty crucible was 18. 2311g and the mass of the crucible with CaCO3(s) was 18. 5467g. a) Find the wt% Ca in the mineral.

b) Why is the unknown solution heated to boiling and the precipitant solution, (NH4)2 C2O4, also heated before slowly mixing the two? c) What is the purpose of washing the precipitate with 0. 1wt% (NH4)2 C2O4? d) What is the purpose of testing the filtrate with AgNO3 solution? 7-12) Combustion of 8. 732mg of an unknown organic compound gave 16. 432mg of CO2 and 2. 840mg of H2O. a) Find the wt% of C and H in the substance.

b) Find the smallest reasonable integer mole ratio of C: H in the compound. 7-16) A mixture of Al2O3(s) and CuO(s) weighing 18. 371mg was heated under H2(g) in a thermogravimetric experiment. On reaching a temperature of 1000 degree C, the mass was 17. 462mg and the final products were

Al2O3(s), Cu(s), and H2O(g). Find the weight percent of Al2O3 in the original solid mixture. Skoog: 5-7, 8, 11, 13, 17

5-7) Write an equation showing how the mass of the substance on the left can be converted to the mass of the substance on the right. Sought:

a) SO3

b) In

c) CuO

d) Na2B4O2 x 10H2O

Weighed:

a) BaSO4

b) In2O3

c) Cu2(SCN)2

d) B2O3

5-8) Treatment of a 0. 4000g sample of impure potassium chloride with an excess of AgNO2 resulted in the formation of 0. 7332g of AgCl. Calculate the percentage of KCl in the sample. 5-11) A 0. 7406g sample of impure magnesite, MgCO3, was decomposed with HCl; the liberated CO2 was collected on calcium oxide and found to weigh 0. 1881g. Calculate the percentage of magnesium in the sample. 5-13) The mercury in a 0. 7152g sample was precipitated with an excess of paraperiodic acid; H5IO6: Chemical Equation:

5Hg positive 2 cation, + 2H5IO6, Right Arrow, Hg5(IO6)2 + 10H positive cation 5-17) A 0. 6407g sample containing chloride and iodide ions gave a silver halide precipitate weighing 0. 4430g. This precipitate was then

strongly heated in a stream of Cl2 gas to convert the AgI to AgCl; on completion of this treatment, the precipitate weighed 0. 3181g. Calculate the percentage of chloride and iodide in the sample.